DEPARTMENT OF CIVIL ENGINEERING

III-B.Tech-I SEMESTER / SEMESTER-V

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
Theory Courses							
1	PC	24ACIV51T	Design of Reinforced Concrete Structures	3	0	0	3
2	PC	24ACIV52T	Geotechnical Engineering	3	0	0	3
3	PC	24ACIV53T	Transportation Engineering	3	0	0	3
4	PE-1	24ACIV5AT	Prestressed Concrete	3	0	0	3
		24ACIV5BT	Sustainable Construction methods				
		24ACIV5CT	Ground Improvement Techniques				
5	OE-1	24ACIV5DT	MOOC (Self -Disciplinary)	3	0	0	3
6	PC	24ACIV51L	Analysis and Design of structures Laboratory -I (Staad Pro/AI)	0	0	3	1.5
7	PC	24ACIV52L	Geotechnical Engineering Laboratory	0	0	3	1.5
8	PC	24ACIV53L	Transportation Engineering Laboratory	0	0	3	1.5
9	SEC	24ACIV54L	Civil Engineering Workshop	1	0	2	2
10	MC	24AMBA51T	Technical Paper Writing and Intellectual Property Rights	3	0	0	0
11	Internship	24ACIV55I	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)	0	0	0	2
						Total credits	**23.5**

Category	Credits
Professional core Courses (PC)	13.5
Professional Elective courses (PEC)	3
Open Elective Course (OEC)	3
Skill Enhancement course (SEC)	2
Mandatory Course(MC)	0
Summer Internship (I)	2
Total Credits	**23.5**

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **DESIGN OF REINFORCED CONCRETE STRUCTURES**

Category : PC

Year : III

Semester : I

Course Code : 24ACIV51T

Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand design philosophies of RC structures as per IS 456:2000.
2. To demonstrate design of beams, slabs, columns, staircases, and footings using Limit State Method.
3. To study behavior of RC members under flexure, shear, torsion, and bond.
4. To ensure safety and serviceability of structures under loads.
5. To teach basic skills in RC design using charts.

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the design concepts and philosophies of reinforced concrete structures as per IS 456:2000.
2. Analyze and design singly and doubly reinforced beams for flexure, shear, and bond using Limit State Method.
3. Design one-way, two-way slabs and staircases under different loading and boundary conditions.
4. Design columns subjected to axial load, uniaxial and biaxial bending.
5. Design isolated footings and evaluate serviceability requirements such as deflection and cracking.

Unit 1 Design Concepts **08**

Behavior of Plain and RC Beams, Introduction to Materials, recommendation in IS 456 – 2000, grades of concrete, Basic statistical principles – Characteristic loads– Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Design Philosophy: Elastic Method, Ultimate Load Method and Limit State Method- Advantages – Assumptions, Design of Singly Reinforced Beam by Working Stress Method.

Unit 2 Design of Beams 09

Limit State Philosophy as Detailed in IS Code - Analysis and Design of Singly, Doubly Reinforced Rectangular and Continuous Beams. Design of RC Members for Bond, Shear and torsion.

Unit 3 Design of Slabs **10**

Design of One Way and Two Way slabs subjected to various Boundary Conditions, Stair Cases: Classification, Design of Dog-Legged Staircase.

Unit 4 Design of Columns **11**

Classification of Columns – Design of Short Rectangular Columns for Axial, Uniaxial and Biaxial Bending demo.

Unit 5 Design of Footings & Serviceability **10**

Footings – Design of Isolated - Flat and Sloped Footings.

Serviceability: Design for Deflection and Cracking,

Prescribed Textbooks:

1. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

Reference Books:

1. Design of Reinforced Concrete Structures, by Gambhir .M.L, Prentice Hall of India, Pvt. Ltd., New Delhi, 2008
2. "Code of Practice for Plain and Reinforced Concrete", BIS, New Delhi, IS456-2000.
3. Relevant IS codes such as IS 875, ,IS 3370(Part-IV), BIS 2000, SP-16.
4. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV51T.1	3	2	1	–	–	–	1	–	–	–	2	3	1
24ACIV51T.2	3	3	3	1	1	–	1	–	–	–	2	3	2
24ACIV51T.3	3	3	3	1	1	–	1	–	–	–	2	3	2
24ACIV51T.4	3	3	3	1	1	–	1	–	–	–	2	3	2
24ACIV51T.5	3	2	3	1	1	1	1	–	–	1	2	2	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **GEOTECHNICAL ENGINEERING**
Category : PC
Year : III
Semester : I
Course Code : 24ACIV52T
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To understand the basic properties and index properties of soils, their measurement and interrelationships.
2. To study soil classification systems and engineering behavior based on grain size distribution and consistency limits.
3. To understand the concepts of permeability and seepage through soils and their practical applications.
4. To demonstrate stress distribution in soils due to different types of loading conditions.
5. To study compaction and consolidation characteristics of soils and their significance in settlement analysis.

Course Outcomes:
At the end of the course, the student will be able to
1. Determine index properties of soils and classify them using IS classification system.
2. Evaluate permeability characteristics and analyze seepage through soils.
3. Estimate stress distribution in soils under various loading conditions using theoretical approaches.
4. Analyze compaction behavior and apply field compaction control methods.
5. Evaluate consolidation characteristics of soils and estimate settlements of foundations.

Unit 1 Soil Index Properties **11**

Phase Diagram, Void ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density and their interrelationships -clay mineralogy and soil structure. Significance and Laboratory determination -Water content, Specific Gravity, Particle size distribution (Sieve analysis and Hydrometer analysis), Relative density, Consistency limits and their indices, in-situ density, Activity of Clay, Thixotropy of clay, IS classification - Plasticity chart and its importance.

Unit 2 Permeability & Seepage **10**

Permeability: Types of soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered systems.
Seepage: Seepage velocity, Seepage pressure, seepage through soils- total, neutral and effective stresses – quick sand condition, flow net: characteristics and uses, numerical problems.

Unit 3 Stress Distribution in Soils **09**

Estimation of stresses in soils – Boussinesq's theory for point loads, stress distribution in different loaded areas-line load, uniformly loaded circular, strip footing. Westergaard's theory, pressure bulb, variation of vertical stress under point load along the vertical and horizontal planes – Newmark's influence chart

Unit 4 Compaction and Consolidation **10**

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties – Field compaction Equipment – compaction control
Consolidation: Types of Compressibility – Immediate settlement – Primary consolidation and secondary consolidation – Stress history of clay, normally consolidated soil, over consolidated soil and under consolidated soil- preconsolidation pressure and its determination- Estimation of settlements -Terzaghi's 1-D consolidation theory – Coefficient of consolidation and its determination.

Unit 5 Shear Strength of Soils **10**

Definition and use of shear strength - Normal and Shear stresses on a plane – Mohr's stress circle- Mohr-Coulomb failure theory- Measurement of shear strength -Direct shear test, Tri-axial shear test, Unconfined compression test and vane shear test – shear strength of granular soil, shear strength of clay, Factors affecting

shear strength of granular soils and clay, Liquefaction.

Prescribed Textbooks:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.

Reference Books:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV52T.1	3	2	1	2	–	–	-	–	–	1	1	3	1
24ACIV52T.2	3	3	1	2	1	–	-	–	–	1	1	3	2
24ACIV52T.3	3	3	2	2	1	–	-	–	–	1	1	3	2
24ACIV52T.4	3	3	2	2	1	–	-	–	–	1	2	3	2
24ACIV52T.5	3	3	2	2	1	-	-	–	–	1	2	2	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **TRANSPORTATION ENGINEERING**
Category : PC
Year : III
Semester : I
Course Code : 24ACIV53T
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To understand the principles of highway development, planning, and alignment.
2. To learn geometric design aspects of highways for safe and efficient traffic movement.
3. To study traffic characteristics, analysis, and control measures.
4. To understand properties of pavement materials and mix design.
5. To learn the design principles of flexible and rigid pavements.

Course Outcomes:
At the end of the course, the student will be able to
1. Explain highway planning, alignment, and road network patterns.
2. Apply geometric design principles for highways including curves and sight distance.
3. Analyze traffic data and design traffic control devices and signals.
4. Evaluate properties of pavement materials and perform mix design.
5. Design flexible and rigid pavements using standard methods.

Unit 1 Highway Development and Planning **10**
Introduction - Classification of roads, road development in India, Current Road projects in India; highway alignment - Factors affecting, project preparation. Road Network Patterns - Engineering Surveys – Drawings and Reports.

Unit 2 Geometric Design of Highways 09
Introduction; highway cross section elements; sight distance, Gradients, Grade Compensation, Design - horizontal alignment, Vertical alignment, Super elevation, Extra widening and Curves.

Unit 3 Traffic Engineering **12**
Basic Parameters of Traffic-Volume, Speed and Density – inter relation - Traffic Volume Studies- Data Collection and Presentation-speed studies - Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams-Road Traffic Signs – Types and Specifications, Road Markings - Necessity, Types and Specifications, Design of Traffic Signals (Webster's Method).

Unit 4 Pavement Materials and Mix Design **08**
Introduction- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, Bitumen Mix Design.

Unit 5 Pavement Design **11**
Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course, Design of Flexible pavement – G.I method, CBR Method, Tri-axial method, Design of Rigid pavements – Critical load positions - Westergaard's stress equations - stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements - Numerical examples.

Prescribed Textbooks:
1. Highway Engineering – S.K.Khanna & C.E.G. Justo, Nemchand & Bros., 7th edition (2000).

Reference Books:
1. Highway Engineering – S.P.Bindra ,DhanpatRai& Sons. – 4th Edition (1981)

2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24ACIV53T.1	3	2	1	1	1	2	-	–	1	–	2	2	2
24ACIV53T.2	3	3	3	2	2	2	-	–	1	–	2	3	2
24ACIV53T.3	3	3	2	2	2	3	1	1	2	–	2	2	3
24ACIV53T.4	3	2	1	2	2	1	-	1	1	1	2	3	2
24ACIV53T .5	3	3	3	2	2	2	-	–	1	–	2	3	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **PRESTRESSED CONCRETE**
Category : PE
Year : III
Semester : I
Course Code : 24ACIV5AT
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To understand the basic principles and systems of prestressing in concrete structures.
2. To study different prestressing methods and the need for high-strength materials.
3. To demonstrate losses of prestress in pre-tensioned and post-tensioned members.
4. To understand the analysis and design of prestressed concrete beams for flexure and shear.
5. To study deflection behavior and analysis of composite prestressed concrete beams.

Course Outcomes:
At the end of the course, the student will be able to
1. Explain the concepts, systems, and methods of prestressing in concrete.
2. Evaluate different types of prestress losses in PSC members.
3. Analyze and design prestressed concrete beams for flexure and shear using IS 1343.
4. Assess short-term and long-term deflections in prestressed members.
5. Analyze composite beams considering stress distribution and shrinkage effects.

Unit 1 Prestressing systems **11**
Introduction, Principles of Pre-Stressing, Prestressing Systems – Pre-Tensioning and Post-Tensioning- Advantages and Limitations, Need for High Strength Materials. Methods - Pre-Tensioning (Hoyer System) and Post-Tensioning Methods (Freyssinet System and Gifford- Udall System).

Unit 2 Loss of Pre-stress 10
Loss of Pre-Stress in Pre-Tensioned and Post-Tensioned Members - Elastic Shortening, Shrinkage and Creep of Concrete, Relaxation of Stress in Steel, Anchorage Slip and Frictional Losses.

Unit 3 Analysis and design for Flexure and Shear 12
Analysis of Beams for Flexure and Shear - Straight, Concentric, Eccentric, Bent and Parabolic Tendons- Kern Line - Cable Profile, load balancing concept Design of PSC Beams (Rectangular and I Sections) Using IS 1343. Introduction to Transmission Length and End Block.

Unit 4 Deflections 13
Control of Deflections- Factors Influencing Deflection - Short Term Deflection of Uncracked Beams, Prediction of Long Time Deflection.

Unit 5 Composite beams 11
Propped and Un-Propped, Stress Distribution, Differential Shrinkage, Analysis of Composite Beams.

Prescribed Textbooks:

1. Prestressed Concrete by N. Krishna Raju, Tata McGraw Hill Publications 7th edition 2025

Reference Books:
1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns, John Wiley & Sons 3rd edition 2010
2. Prestressed Concrete Design by Praveen Nagrajan, Pearson publications, 2013.
3. Prestressed Concrete by Ramamuratam, Dhanpatrai Publications 2020 edition
4. BIS code on —prestressed concrete, IS: 1343 to be permitted into the examination Hall

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CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV5AT.1	2	1	1	-	-	1	-	-	1	-	1	3	1
24ACIV5AT.2	2	2	1	1	2	-	-	-	-	-	1	3	2
24ACIV5AT.3	2	2	3	2	2	-	1	-	-	-	1	3	3
24ACIV5AT.4	2	1	2	2	3	1	-	-	-	-	1	2	3
24ACIV5AT.5	2	2	2	1	2	1	-	-	-	-	1	2	2

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **SUSTAINABLE CONSTRUCTION METHODS**
Category : PE
Year : III
Semester : I
Course Code : 24ACIV5BT
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To understand the concepts, principles, and importance of sustainability and green buildings.
2. To study green building practices, rating systems, and their implementation in India.
3. To learn energy-efficient building design and use of renewable energy sources.
4. To understand HVAC systems and their role in energy-efficient buildings.
5. To study material conservation and indoor environmental quality for healthy buildings.

Course Outcomes:
At the end of the course, the student will be able to
1. Explain sustainability concepts and green building features.
2. Apply green building practices and evaluate rating systems like LEED.
3. Analyze energy-efficient building design and use of renewable energy sources.
4. Evaluate HVAC systems for energy conservation in buildings.
5. Assess material conservation techniques and indoor environmental quality.

Unit 1 Sustainability **9**
Green Buildings - Definition, Need, benefits, Materials and Equipment in India, Key Requisites and Important Sustainable features.

Unit 2 Green Buildings and Practices **13**
Green Buildings - Movement in India, Benefits, Opportunities, Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, Rating Systems - Residential Sector, Market Transformation, LEED India Rating System.

Unit 3 Green Building Design **12**
Reduction in Energy Demand, Onsite Sources and Sinks, Maximize System Efficiency, Steps to Reduce Energy,
Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement.

Unit 4 Heat Ventilation and Air Conditioning System **13**
CII Godrej Green business center, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement. Use of Geothermal Energy for Cooling and heating structures..

Unit 5 Material Conservation and Indoor Environment Quality (IEQ) **12**
Waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture.
Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels.

Prescribed Textbooks:
1. Sustainable Building Design Manual Part-1 & Part-2, The Energy and Resources Institute, TERI- 2004

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Reference Books:

1. Green Building Hand Book by Tomwoolley and Samkimings, 2009.
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009.
3. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV5BT.1	3	2	1	1	-	2	-	-	-	-	1	2	1
24ACIV5BT.2	3	2	1	1	-	1	-	-	-	-	1	2	1
24ACIV5BT.3	3	3	3	2	-	1	-	-	-	-	1	2	2
24ACIV5BT.4	3	2	3	2	-	1	-	-	-	-	1	1	3
24ACIV5BT.5	3	2	2	2	-	1	-	-	-	-	1	2	2

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **GROUND IMPROVEMENT TECHNIQUES**

Category : PE

Year : III

Semester : I

Course Code : 24ACIV5CT

Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the formation of soil deposits and need for ground improvement.
2. To study compaction principles and field compaction techniques.
3. To learn drainage and dewatering methods for soil stabilization.
4. To understand vibration methods, grouting, and injection techniques.
5. To study geosynthetics and various soil stabilization methods.

Course Outcomes:

At the end of the course, the student will be able to

1. Explain soil formation, distribution, and ground improvement requirements.
2. Apply compaction techniques and quality control measures in the field.
3. Analyze drainage and dewatering systems for seepage control.
4. Evaluate ground improvement methods such as vibration and grouting.
5. Assess geosynthetics and soil stabilization techniques for engineering applications.

Unit 1 Formation and Development of Ground **10**

Introduction, Formation of Rock and Soil Profile, Soil Distribution in India, Alterations of Ground after formation, Reclaimed Soils, Natural Offshore Deposits, Ground Improvement Potential

Unit 2 Compaction 8

Introduction, Compaction Mechanics, Field Procedure, Surface Compaction, Selection of Field Compaction Procedures, Compaction Quality Control.

Unit 3 Drainage Methods **9**

Introduction, Seepage, Filter Requirements, Groundwater, Groundwater and Seepage Control, Methods of Dewatering Systems, Design Steps for Dewatering Systems, Drains.

Unit 4 Vibration Methods, Grouting and Injection 10

Vibration Methods-Introduction, Vibro compaction, Vibro displacement compaction

Grouting and Injection - Introduction, aspects of grouting, grouting procedure, applications

Unit 5 Geosynthetics, Stabilization Techniques **11**

Geosynthetics - Introduction, types, properties and applications.

Stabilization Techniques -Introduction, requirements of soil stabilization, mechanical, Cementing, bituminous and chemical stabilization.

Prescribed Textbooks:

1. Ground Improvement Techniques by Dr. P. Purushotham Raj. Laxmi Publications, New Delhi University science press, New Delhi 2nd edition 2016

Reference Books:

1. Ground Improvement, Moseley M.P. Blackie Academic and Professional, Boca Taton, Florida, USA (1993).
2. Ground Improvement Techniques, Nihar Ranajan Patra Vikas Publications, New Delhi

3. Ground Control and Improvement, Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) John Wiley and Sons, New York, USA.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV5CT.1	3	2	1	1	–	–	–	–	–	–	1	3	2
24ACIV5CT.2	3	3	2	2	2	–	–	–	–	–	1	3	2
24ACIV5CT.3	3	3	3	2	2	–	–	–	–	–	1	3	2
24ACIV5CT.4	3	3	2	2	2	–	–	–	–	–	2	3	2
24ACIV5CT.5	3	3	3	2	3	2	–	–	–	–	3	3	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course	:	**ANALYSIS AND DESIGN OF STRUCTURES LAB-I (STAAD PRO)**
Category	:	PC
Year	:	III
Semester	:	I
Course Code	:	24ACIV51L
Branch/es	:	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To introduce the fundamentals of structural analysis using STAAD Pro.
2. To demonstrate the design of structural elements such as beams, frames, slabs, and retaining walls.
3. To develop skills in modeling and analysis of 2D and 3D structures.
4. To understand the application of loads such as wind and earthquake on structures.
5. To teach practical knowledge in design of complex structures like water tanks and bridges.

Course Outcomes:

At the end of the course, the student will be able to

1. Model and analyze structural systems using STAAD Pro software.
2. Analyze and design beams, frames, slabs, and retaining walls.
3. Perform analysis of 2D and 3D structural systems.
4. Apply wind and earthquake loads in structural design.
5. Analyze and design complex structures such as trusses, water tanks, and bridge decks.
6.

List of Experiments: -

1. Introduction to STAAD Pro
2. Analysis and design of Continuous beam
3. Analysis and Design of 2D Frame
4. Analysis and Design of 3D frames
5. Analysis and Design of Two-way slab
6. Analysis and Design of Retaining wall
7. Analysis of 3D Steel truss
8. Analysis and Design of Water tank
9. Analysis and Design of a Building for Wind & earthquake load application
10. Analysis and Design of Deck Slab Bridge.

Note- 8 Experiments out of 10 should be conducted mandatorily

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV51L.1	3	1	2	–	3	–	–	1	2	1	2	2	2
24ACIV51L.2	3	2	2	–	3	1	–	1	2	1	2	2	3
24ACIV51L.3	3	2	3	1	3	–	–	1	2	2	2	3	3
24ACIV51L.4	3	2	3	1	3	–	–	1	2	2	2	3	2
24ACIV51L.5	3	3	3	2	3	1	1	1	2	2	2	3	3

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DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **GEOTECHNICAL ENGINEERING LABORATORY**
Category : PC
Year : III
Semester : I
Course Code : 24ACIV52L
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To demonstrate index properties of soils through standard laboratory tests.
2. To understand in-situ density and compaction characteristics of soils.
3. To demonstrate engineering properties such as permeability and shear strength.
4. To perform laboratory tests for soil classification and strength assessment.
5. To teach practical skills in conducting and interpreting geotechnical tests

Course Outcomes:

At the end of the course, the student will be able to

1. Determine index properties and classify soils based on laboratory results.
2. Evaluate field density and compaction characteristics of soils.
3. Analyze permeability of soils using constant and falling head methods.
4. Determine shear strength parameters of soils using standard tests.
5. Assess bearing capacity of soils using CBR test.

List of Experiments: -

I. Index Properties

1. Determination of Specific Gravity of Soil
2. Grain Size Distribution – Sieve Analysis
3. Grain Size Distribution - Hydrometer Analysis
4. Determination of Liquid Limit and Plastic Limit of a soil sample

II. In-Situ Density and Compaction Characteristics

1. Determination of Field Density by Sand Replacement and Core Cutter Method.
2. Determination of Moisture–Density Relationship using Standard Proctor and Modified Proctor Tests.

III. Engineering Properties

1. Determination of Permeability by Constant Head Method.
2. Determination of Permeability by Falling Head Method.
3. Determination of Shear Strength of Cohesion Less Soil by Direct Shear Test.
4. Determination of Shear Strength of Cohesive Soil by Unconfined Compression Test.
5. Determination of Undrained shear strength of Cohesive Soil by Vane Shear Test.
6. Determination of Bearing Capacity of Subgrade soils by California Bearing Ratio Test (CBR).

Note- 10 Experiments out of 12 should be conducted mandatorily

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV52L.1	3	2	1	3	2	-	–	2	2	–	1	3	3
24ACIV52L.2	3	2	1	3	2	1	–	2	2	1	1	3	3
24ACIV52L.3	3	3	1	3	2	1	–	2	2	1	1	3	3
24ACIV52L.4	3	3	1	3	2	1	–	2	2	1	1	3	3
24ACIV52L.5	3	3	2	3	2	2	1	2	2	1	2	3	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **TRANSPORTATION ENGINEERING LABORATORY**
Category : PC
Year : III
Semester : I
Course Code : 24ACIV53L
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
1. To demonstrate physical and mechanical properties of road aggregates.
2. To demonstrate e strength, durability, and shape characteristics of aggregates.
3. To study engineering properties of bituminous materials.
4. To understand standard testing procedures for highway materials.
5. To teach practical skills in testing and quality control of pavement materials.

Course Outcomes:
At the end of the course, the student will be able to
1. Determine strength and durability properties of aggregates using standard tests.
2. Evaluate shape characteristics and suitability of aggregates for road works.
3. Analyze engineering properties of bitumen such as penetration, ductility, and softening point.
4. Conduct standard laboratory tests on highway materials as per specifications.
5. Assess suitability of materials for pavement construction and quality control.

List of Experiments: -

Road Aggregates:
1. Determination of Aggregate Crushing Value
2. Determination of Aggregate Impact Value
3. Determination of Specific Gravity and Water Absorption of Aggregates
4. Determination of Attrition Value of Aggregates
5. Determination of Abrasion Value of Aggregates (Los Angeles Test)
6. Determination of Shape Characteristics of Aggregates (Flakiness Index & Elongation Index)

Bituminous Materials:
1. Determination of Penetration Value of Bitumen
2. Determination of Ductility of Bitumen
3. Determination of Softening Point of Bitumen (Ring and Ball Method)
4. Determination of Flash and Fire Point of Bitumen

Note- 9 Experiments out of 10 should be conducted mandatorily.

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV53L.1	2	2	–	2	3	1	1	1	1	–	2	2	3
24ACIV53L.2	2	2	–	2	3	1	1	1	1	–	2	2	3
24ACIV53L.3	2	2	–	2	3	1	1	1	1	–	2	2	3
24ACIV53L.4	3	3	–	2	3	1	1	1	1	–	2	2	2
24ACIV53L.5	3	1	–	2	3	1	1	1	1	–	2	2	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course : **CIVIL ENGINEERING WORKSHOP**
Category : SEC
Year : III
Semester : I
Course Code : 24ACIV54L
Branch/es : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
1. To provide practical knowledge of field setting out and basic construction techniques.
2. To understand masonry, concrete, and brick manufacturing processes.
3. To learn installation of basic building services like plumbing and finishing works.
4. To teach skills in construction practices such as plastering, painting, and flooring.
5. To understand basic structural concepts and model making of civil engineering structures.

Course Outcomes:
At the end of the course, the student will be able to
1. Perform field setting out of building layouts with accuracy.
2. Eexecute basic construction activities such as masonry, plastering, and flooring.
3. Prepare and test construction materials like bricks and concrete blocks.
4. Install and test basic plumbing systems in buildings.
5. Demonstrate understanding of structural behavior through experiments and model making.

List of Experiments: -

1. Field Setting Out of a 1BHK Layout Using Tape, Cross Staff and Auto Level with Accuracy Verification
2. Construction of Brick Masonry Corner in English Bond with Mortar and Verticality/Alignment Assessment 1m height
3. Design, Casting, Curing and Quality Assessment of Cover Blocks
4. Preparation, Curing and Compressive Strength Evaluation of Stabilized Soil-Cement bricks.
5. Casting, Curing and Strength Testing of Fly Ash Concrete bricks.
6. Installation, Threading and Leak Testing of Basic Building Plumbing System with Pipe Fittings
7. Surface Preparation, Cement Plaster Application and Painting Operations.
8. Base Preparation, Alignment Control and Laying of Ceramic Tile Flooring over Five Square Meter Area.
9. Determination of Centre of Gravity and Moment of Inertia of Rolled Steel Sections by Experimental Measurements.
10. Model making of different structures like building, bridges and different types of trusses.

Note- 8 Experiments out of 10 should be conducted mandatorily

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24ACIV64L.1	3	2	1	2	3	1	1	2	-	1	2	2	3
24ACIV64L.2	3	2	2	1	2	2	2	2	-	1	2	2	3
24ACIV64L.3	3	2	3	3	2	1	3	2	1	2	2	1	3
24ACIV64L.4	3	2	2	1	2	3	2	2	1	1	2	1	3
24ACIV64L.5	3	3	2	3	2	1	1	2	2	2	3	2	3

DEPARTMENT OF CIVIL ENGINEERING

Title of the Course: **TECHNICAL PAPER WRITING AND INTELLECTUAL PROPERTY RIGHTS**

Category : HSMC
Course Code : 24AMBA51T
Year : III B.Tech
Semester : I Semester
Branch : CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	2

Course Objectives:

1. To enable the students to practice the basic skills of research paper writing.
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help them in knowing the significance of real life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks.

Course Outcomes

1. Identify key secondary literature related to their proposed technical paper writing.
2. Explain various principles and styles in technical writing.
3. Use the acquired knowledge in writing a research/technical paper.
4. Analyze rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc.
5. Evaluate different forms of IPR available at national & international level and search of various forms of IPI by using modern tools and techniques.

Unit 1 Principles of Technical Writing **8**

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.Learning Outcomes

Unit 2 Research Paper Writing **6**

Technical Research Paper Writing: Abstract- Objectives-Limitations-Review of Literature- Problemsand Framing Research Questions- Synopsis.

Unit 3 Process of research **6**

Process of research: publication mechanism: types of journals- indexing-seminars- conferences- proof reading –plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules.

Unit 4 Introduction to Intellectual property: **5**

Introduction, types of intellectual property, International organizations, agencies and treaties, importance of intellectual property rights Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Unit 5 Fundamentals of copy right law **6**

Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.Patent law, intellectual property audits.

DEPARTMENT OF CIVIL ENGINEERING

Prescribed Textbooks:

1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013

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Reference Books:

1. R.Myneni, Law of Intellectual Property, 9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli,Intellectual Property Rights Tata Mcgraw Hill, 2001

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Online Resources

1. https://theconceptwriters.com.pk/principles-of-technical-writing/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
23AHSM61T-1	3	2	2	2	1	2	-	-	-	1	-		
23AHSM61T- 2	2	3	3	2	2	1	-	-	-	-	-		
23AHSM61T- 3	3	2	3	2	2	1	1	-	-	-	-		
23AHSM61T- 4	2	3	2	2	2	1	1	-	-	-	-		
23AHSM61T- 5	2	2	2	1	3	1	1	-	-	1	1		